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Final Report

THE EFFECT OF TWO DEGREES OF ROOT PRUNING ON SURVIVAL AND GROWTH  
OF PLANTED PONDEROSA PINE NURSERY STOCK IN SOUTHERN IDAHO

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The plantations in this experiment were practically complete failures, largely because of the spring and summer drought of 1940. Even the June inspection showed rather low survival of plantings made the previous fall, so unfavorable winter conditions also may have been a factor.

Data for survival at the end of the first year were compiled in the accompanying Summaries 1 and 2, as suggested in Schopmeyer's progress report of March 26, 1941. Contrary to the statement in that report, survival was better on Granite Creek than on Pine Creek plots, so data ~~are~~ compiled for both. Average survival for all planted trees on all plots ~~was~~ 4.7 percent of number planted. Many rows had no survivors. However, percentage survival varied with conditions and ran up to 50 percent on one row: spring planted Prison 2-0 stock with 12-inch roots on the north slope Granite Creek plot. Survival was much better on north exposures than on east exposures: 6.9 percent vs. 0.6 percent on Pine Creek plots, and 10.4 percent vs. 0.8 percent on Granite Creek plots.

Although they are obviously inadequate as a basis of useful conclusions, especially any conclusions as to the magnitude of differences that might be expected, the few survival figures do tend to substantiate the hypothesis in regard to degree of root pruning and previous findings relative to aspect and stock. Thus the average survival of stock with 12-inch roots was about three times that of stock with 6-inch roots. The advantage of longer-rooted stock held for both sources and ages of stock and for both fall and spring planting as a whole. As to season of planting it may be noted, however, that fall-planted Bannock stock was a complete failure, and spring-planted Prison 1-2 stock nearly so. Thus the average figures for fall planting survival are largely those for Prison 1-2 stock, and those for spring planting are mostly for Bannock<sup>3-0</sup> and Prison 2-0 stock.

The relatively good survival of Prison 2-0 stock on the Granite Creek North plot (mostly on two adjacent rows) contrasts with its failure on other plots. The poor survival of Prison 1-2 stock in spring planting may be related to its later date of planting and its apparently rather poor condition at that time (could not obtain stock at same time as other).

The very poor behavior of Bannock 3-0 (really F2P1-0 stock; i.e., root pruned at end of second year in seedbed) was rather surprising at first and not fully explainable. Of course previous tests of various forms of stock had shown the relative superiority of a short sturdy type of transplant, and the Bannock stock tended to have rather long spindly tops. The possibility of more careful lifting and of transporting the Bannock stock directly from nursery to field should have been of some advantage (although the Prison 2-0

stock was also handled fairly promptly). Other experiments (tool test, etc.) using the Bannock seedbed stock have shown that it is not the proper form for best results in field planting.

If the Bannock stock had survived better in general, it would probably have shown the difference due to different root lengths more accurately than the Prison stock, as the latter in many cases did not have roots fully 12 inches long (because of mode of transplanting and lifting in nursery). Even the low survival figures given suggest a larger difference for the Bannock stock.

The several experiments dealing with various degrees of root pruning of planting stock (of which this was the last) have been disappointing insofar as yielding a real measure of the degree of advantage of longer roots and of how long they should be. (The study designated Fp-9a in fact tended to show that 8-inch roots were as good or better than 12-inch roots.) In general, there is a positive suggestion that longer roots are of some advantage but there is also the negative suggestion that the use of longer-rooted stock is not sufficient in itself to insure against high mortality and practical failure in dry or even in "normal" seasons in south central Idaho.

I would still question whether the possible advantage of longer roots (and, necessarily, deep planting) has been given a full, fair, and conclusive test. The 1940 season was a tough one for pine seedlings and it is the only year when root pruning was given a test on near the scale needed for conclusive results. Furthermore, it may be questioned whether the procedure of chopping off roots to certain lengths after lifting gives the same results as if nursery practice in all its stages was conducted to produce roots of a certain length. (This is not to argue against the technique of the experiment, as that was the only feasible procedure at the time.) In the Bannock Creek nursery some efforts were made to produce long-rooted stock, but the nursery studies had to be abandoned before results were obtained. In planning future studies (and it appears that further experimentation is justified, though not of high priority), due attention should be given to the nursery phase prior to or at least concurrent with further field tests.

The extra expense of growing long-rooted stock (say 12 to 15 inches) in the nursery and of planting it in the field may not be justified; we would need considerable more evidence to show its advantage as well as cost data to prove that is worth while. However, it may be concluded both from these root pruning tests and from numerous other plantings using stock of various sizes and average root lengths that it is a waste of effort to plant stock with roots not more than 6 inches long in this locality (except possibly in unusually moist seasons like 1942). As a practical compromise at this time, it is recommended that the aim should be to produce stock with roots 8 inches to 10 inches long, and that field planting technique be such as to plant these trees properly without bending back the roots.

The study is closed with this report, even if the subject is not. No further attention need be given the plantations. Apparently no permanent numbered corner posts were placed on the plots and it does not seem of any value to do so now or to incorporate them in the permanent series of regeneration plots. The sites are available for any future experiments in planting.

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